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EXAMINER	
ELLIS, SUEZU Y	

ART UNIT	PAPER NUMBER
2878	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/771,787	ITO, TAKESHI	
	Examiner	Art Unit	
	Suezu Ellis	2878	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *04 February 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-39* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *26 and 38* is/are allowed.

6)☒ Claim(s) *1-25,27-32,35-37 and 39* is/are rejected.

7)☒ Claim(s) *33 and 34* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *04 February 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Priority

Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Information Disclosure Statement

The information disclosure statement (IDS) submitted on February 4, 2004 is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

Claim Objections

Claim 38 is objected to because of the following informalities: With respect to claim 38, claim language on pg. 59, line 4 recites "having passes through". The verb tense is incorrect. Replace "passes" with --passed--. Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-25, 37 and 39 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

With respect to claims 1 and 39, claim language recites on pg. 50, lines 16-18, the width of the light beam exit opening in a scale moving direction is determined depending on the values of z1, z2 and p1. The relationship between the width of the exit opening and the distance and pitch values is unclear. It is unclear as to how the width of the can be determined while being dependent on distance and pitch values. Does the width of the exit change (i.e. open or close) depending on if the pitch of the scale changes? Please clarify. For examining purposes, the relationship of the width its dependency to the distances and pitch will be treated as though the width is such that light can reach the scale and also be detected.

Claim 37 recites the limitations "the photo detector" on pg. 58, line 2 and "the receiving surface" on pg. 58, lines 26-27. There is insufficient antecedent basis for this limitation in the claim.

Claims not specifically addressed are indefinite due to their dependency.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before

> the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1 and 27 are rejected under 35 U.S.C. 102(b) as being anticipated by Yamamoto et al. (US 2002/0014581). Hereinafter, this reference. will be referred to as Yamamoto '581.

With respect to claim 1, Yamamoto '581 discloses in Fig. 63, prior art illustrating a light source unit (632), a scale with a period pattern (634), a light detector (640), a distance between the scale and light detector being z2, and the periodic pattern of the scale having a pitch (p1). Note, a light beam exit opening is inherent to the light source since an opening is needed for the beam to be emitted from. Fig. 63 further demonstrates the distance between the beam exit opening and the scale is z1 ([0212]). Note, Yamamoto '581 illustrates that the width of the light beam exit must be such that the light beam can reach the scale and also be detected.

With respect to claim 27, Yamamoto '581 discloses in Fig. 12, an optical encoder comprising a light source, a scale with a periodic pattern, a light detector and the light source having an optical unit (111) that splits a beam (beam divergence). Yamamoto '581 further discloses the shape of the light beam can be set (predetermined shape) by appropriately designing the window ([395]; [0396] lines 1-2). It is inherent that the spread angle of the beam is also set if the shape of the light is set, thus the window sets a beam divergent angle of the light beam to a predetermined value.

Claims 1 and 27-29 are rejected under 35 U.S.C. 102(e) as being anticipated by Yamamoto et al. (US 2005/0157307). Hereinafter, this reference will be referred to as Yamamoto '307.

The applied reference has a common assignee with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 102(e) might be overcome either by a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not the invention "by another," or by an appropriate showing under 37 CFR 1.131.

With respect to claims 1 and 27, Yamamoto '307 discloses in Figs. 1 and 2, an optical encoder comprising a light source unit (10), a scale with a periodic pattern (2), a light detector (3), and a light beam exit opening (window from which light emerges). Fig. 1 illustrates the distance between the scale and light detector being z2 and the distance between the light source, which has a beam exit opening, and the scale is z1. Fig. 1 illustrates a beam spread (divergent beams) thus an optical unit that creates the divergent beams is inherent. Yamamoto '307 discloses the beam exit opening can be set, thus the light emitted has a predetermined shape/spread angle (equivalent to having a predetermined angle value) ([0079], [0082]). Although Yamamoto '307 does not expressly disclose the opening being dependent on distance and pitch values,

the setting of the opening must take into account the distance and pitch of the scale in order to ensure the emitted light reaches the scale and light detector.

With respect to claim 28, Yamamoto '307 discloses the light source, the scale and the light detector are arranged such that the arrangement satisfies the equation $1/z1 + 1/x2 = \lambda(n(p1)^2)$. Thus the encoder generates a light intensity pattern, or a Talbot image, on the light receiving surface, wherein the pattern is similar to the diffraction grating pattern ([0014], [0201]).

With respect to claim 29, Yamamoto '307 discloses the scale and the light detector satisfies the relationship in the equation $1/z1 + 1/x2 = \lambda(n(p1)^2$ ([0201]).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 2, 3, 29 and 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamamoto '581.

With respect to claim 2, Yamamoto '581 addresses the limitations of claim 1, however fails to expressly disclose an equation defining the width of the light beam exit opening. However, it would have been obvious to define the width of

the light beam exit opening to ensure that the light reaches the scale and can be detected.

With respect to claim 3, the equation in claim 2 is approximately p1 x (2n-1) x (z1 + z2) / (2 x z2) since it is the median of the two extremes of the equation in claim 2.

With respect to claim 29, the embodiment of Fig. 12 addresses all the limitations of claim 27, however fails to expressly disclose the encoder is configured to satisfy the relation of $1/z1 + 1/x2 = \lambda(n(p1)^2)$. However, Yamamoto '581 discloses in the description of prior art that it is well known for encoders to satisfy the equation above. It would have been obvious to a person of ordinary skill in the art to modify the encoder of Fig. 12 to satisfy the equation in the prior art in order to have an intensity pattern that is substantially analogous to the scale diffraction lattice pattern to be generated on a light receiving surface of the light detector [0021].

With respect to claim 39, Yamamoto '581 discloses in Fig. 63, prior art illustrating a light source unit (632), a scale with a period pattern (634), a light detector (640), a distance between the scale and light detector being z2, and the periodic pattern of the scale having a pitch (p1). Note, a light beam exit opening is inherent to the light source since an opening is needed for the beam to be emitted from. Fig. 63 further demonstrates the distance between the light beam exit opening and the scale is z1 [0212]. Note, Yamamoto '581 illustrates that the width of the light beam exit must be such that the light beam can reach the scale and also be detected. Yamamoto '581 fails to expressly disclose the width of the

light beam exit opening is determined depending on the value of the equation p1 x (z1 + z2) / z2. However, it would have been obvious to define the width of the light beam exit opening to ensure that the light reaches the scale and can be detected.

Claims 2, 3, 19, 30-32, 35-37 and 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamamoto '307.

The applied reference has a common assignee with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art only under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 103(a) might be overcome by: (1) a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not an invention "by another"; (2) a showing of a date of invention for the claimed subject matter of the application which corresponds to subject matter disclosed but not claimed in the reference, prior to the effective U.S. filing date of the reference under 37 CFR 1.131; or (3) an oath or declaration under 37 CFR 1.130 stating that the application and reference are currently owned by the same party and that the inventor named in the application is the prior inventor under 35 U.S.C. 104, together with a terminal disclaimer in accordance with 37 CFR 1.321(c). This rejection might also be overcome by showing that the reference is disqualified under 35 U.S.C. 103(c) as prior art in a rejection under 35 U.S.C. 103(a). See MPEP § 706.02(l)(1) and § 706.02(l)(2).

With respect to claim 2, Yamamoto '307 addresses the limitations of claim 1, however fails to expressly disclose an equation defining the width of the light beam exit opening. However, it would have been obvious to define the width of the light beam exit opening to ensure that the light reaches the scale and can be detected.

With respect to claim 3, the equation in claim 2 is approximately p1 x (2n-1) x (z1 + z2) / (2 x z2) since it is the median of the two extremes of the equation in claim 2.

With respect to claim 19, Yamamoto '307 addresses all the limitations of claim 1. Yamamoto '307 further discloses the beam spread angle can correspond to the spreading area (16) for the formation of the light receiving area, thus the width of the beam exit correlates with the light receiving area. Yamamoto '307 discloses the spatial period of the light receiving areas is equal to the period for the diffraction interference pattern which is set at a period of np1 x (z1+z2) / z1 ([0208], [0209]). Although the equation is different than p1 x (z1 + z2) / (2 x z2), if n=1 and z1 = 1 and z2 = 1, then the equations are equivalent. Thus, the width of the light beam exit opening can be determined by the equation p1 x (z1 + z2) / (2 x z2). Note, it would have been obvious to a person of ordinary skill in the art to create an equation to determine the width of the light beam exit opening, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art.

With respect to claims 30-32, Yamamoto '307 addresses all the limitations of claim 27, however, fails to expressly disclose using a lens, such as a concave

lens, as the optical unit. Yamamoto '307 discloses prior art Fig. 28A, which is very similar to Fig 1. Yamamoto '307 discloses in description for Fig. 28A that Fig. 28A is a low cost laser encoder which does not require assembly of optical parts such as a lens [0003]. Thus, it is interpreted that lenses are well known in the art to be used in conventional laser encoders. Since the set up of the laser encoder of Fig. 28A and Fig. 1 look similar, a lens could be used for the encoder of Fig. 1. Also, applicant discloses the "assembly of optical parts" in the description of Fig. 28A, thus with "parts" being plural, a plurality of lenses could have been used in the conventional encoders. It would have been obvious to a person of ordinary skill in the art to use a lens, especially concave lenses, as a means to diverge the light beams.

With respect to claim 35, the modified Yamamoto '307 addresses all the limitations of claims 27 and 30, however fails to expressly disclose the light beam emitted from the light source is reflected by the scale and does not shield and optical path from the scale toward a region of the light detector. However, it would have been obvious design to a person of ordinary skill in the art to make the encoder have a reflective scale since the technology of transmissive and reflective encoders is interchangeable.

With respect to claim 36, the modified Yamamoto '307 addresses all the limitations of claims 27 and 30. The modified Yamamoto '307 also discloses in Fig. 1, the light detector (3) comprising a plurality of photodetectors (4) which detect a specific portion of the same phase (predetermined phase) in the

diffraction interference pattern formed from the light source by the scale ([0074], [0198]).

With respect to claim 37, the modified Yamamoto '307 discloses in Fig. 2B, a virtual spot light source. Note, the light source has an aperture in the shape of a round spot, thus forming a virtual spot when light passes through the aperture. The modified Yamamoto '307 further discloses in Fig. 1, a photodetector of the light detector is configured to be capable of detecting a specific portion of the same phase (predetermined phase) of a light intensity pattern formed on a receiving surface of the light detector of which period p2 is about p1 x (z2 + z3) / z3, where z2 is a distance between the scale and the light detector, p1 is a pitch of periodic optical pattern of the scale, z3 is a distance from a position of a virtual spot light source to the scale the position being calculated from the divergent angle of the light beam having passed through the optical element.

With respect to claim 39, Yamamoto '307 discloses in Figs. 1 and 2, an optical encoder comprising a light source unit (10), a scale with a periodic pattern (2), a light detector (3), and a light beam exit opening (window from which light emerges). Fig. 1 illustrates the distance between the scale and light detector being z2 and the distance between the light source, which has a beam exit opening, and the scale is z1. Yamamoto '307 discloses the beam exit opening can be set, thus the light emitted has a predetermined shape/spread angle (equivalent to having a predetermined angle value) ([0079], [0082]). Yamamoto '307 fails to expressly disclose the width of the light beam exit opening is

determined depending on the value of the equation p1 x (z1 + z2) / z2. However, it would have been obvious to define the width of the light beam exit opening to ensure that the light reaches the scale and can be detected. Also note, it would have been obvious to a person of ordinary skill in the art to have created an equation to determine the width of the light beam exit opening, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art.

Allowable Subject Matter

Claims 4-18 and 20-25 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

With respect to claim 4, prior art fails to teach or reasonably suggest the values of z1 and z2 being substantially equal to each other, in addition to the other limitations of the claim.

With respect to claims 5 and 20, prior art fails to teach or reasonably suggest the light beam exit opening disposed in the scale moving direction at a position of (z1 + z2) / z2 x m, in addition to the other limitations of the claims.

Claims not specifically addressed would be allowable due to their dependency.

Claims 33 and 34 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

With respect to claim 33, prior art fails to teach or reasonably suggest the optical element which sets a beam divergent angle of the light beam to a predetermined value is a lens wherein the lens is a cylindrical lens having a focusing action only in the scale moving direction, in addition to the other limitations of the claim.

With respect to claim 34, prior art fails to teach or reasonably suggest the optical element which sets a beam divergent angle of the light beam to a predetermined value is a lens wherein the lens has a function of expanding the beam divergent angle of the light beam lens in the scale moving direction and has a function of focusing the beam divergent angle of the light beam in a plane orthogonal to the scale moving direction and parallel to the scale pattern.

Claims 26 and 38 are allowed.

With respect to claims 26, prior art fails to teach or reasonably suggest a method of adjusting a level of an output signal depending on a period p2 of a light intensity pattern formed on a receiving surface of a light detector, wherein the method comprising a step of determining whether or not the level of the output signal is included in a predetermined range and when the level of the output signal is not included in the predetermined range, a distance from the optical element to the scale is changed.

With respect to claims 38, prior art fails to teach or reasonably suggest a method of adjusting a level of an output signal depending on a period p2 of a light intensity pattern formed on a receiving surface of a light detector, wherein the method comprising a step of determining whether or not the level of the output signal is included in a predetermined range and when the level of the output signal is not included in the predetermined range, a distance from a calculated position of a virtual spot light source to a scale is changed.

Telephone/Fax Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Suezu Ellis whose telephone number is 571-272-2868. The examiner can normally be reached on 8:30am-5pm (Monday-Friday).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dave Porta can be reached on 571-272-2444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Stephone B. Allen
Primary Examiner